Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter Of Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band	)	IB Docket No. 06-123

REPLY COMMENTS OF INTELSAT NORTH AMERICA LLC

EXECUTIVE SUMMARY

The Commission should reject EchoStar Satellite L.L.C. ("EchoStar")'s recommendation to auction the 17/24 GHz BSS spectrum. EchoStar's auction proposal would not meet the requirements of the ORBIT Act as interpreted by *Northpoint v. FCC*. The Commission should instead adopt its proposal, supported by all commenters except for EchoStar, to adopt a first-come, first-served licensing process. If the Commission does adopt first-come, first-served, however, it should permit existing applicants to make a one-time amendment to conform their applications to the adopted technical parameters (*e.g.*, a certain grid of orbital locations) without losing their places in the processing queue.

The Commission should adopt a four-degree orbital spacing scheme, which is supported by DIRECTV and SES Americom as well as Intelsat. Four-degree spacing can be achieved while protecting antennas as small as 45 cm, with an aggregate carrier-to-interference ratio of 19 dB. In addition, the Commission should adopt a power-flux density limit of -115 dBW/m^2/MHz, and off-axis e.i.r.p. limits that mirror those found in Section 25.138(a) of the Commission's rules, but with a one MHz reference bandwidth. The Commission should address the interference protection necessary for 12 GHz DBS space stations independently from the adoption of an orbital spacing plan.

Finally, the FCC should allow for flexible and efficient use of the 17/24 GHz BSS spectrum by (1) rejecting EchoStar's proposal to limit the use of the 17/24 GHz BSS band to BSS only; (2) allowing DBS feeder links in the 25 GHz band; and (3) allowing the domestic use of the 17.7-17.8 GHz band by BSS providers, which can be achieved by a freeze on fixed services ("FS") or by making BSS and FS co-primary in this band.

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Intelsat North America LLC ("Intelsat") is pleased to submit these reply comments in response to the Commission's June 23, 2006 *Notice of Proposed Rulemaking*[1] for the 17/24 GHz Broadcasting Satellite Service ("BSS"). As discussed herein, the FCC should reject the arguments by EchoStar to auction the 17/24 GHz BSS spectrum and should adopt a first-come, first-served licensing process for this spectrum. The Commission should also adopt four-degree orbital spacing for this band, as well as the other technical proposals of Intelsat. Finally, the Commission should adopt rules that give providers flexibility in the use of this spectrum.

[1] *Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-directionally in the 17.3-17.8 GHz Frequency Band*, Notice of Proposed Rulemaking, 21 FCC Rcd 7426 (2006) ("*Notice*").

I. THE COMMISSION SHOULD REJECT ARGUMENTS TO AUCTION THE 17/24 GHZ SPECTRUM AND SHOULD ADOPT A FIRST-COME FIRST-SERVED LICENSING PROCESS

Except for EchoStar, all commenters support the Commission's proposal to extend its successful Space Station Reform licensing approach to the new 17/24 GHz BSS service. EchoStar proposes that the Commission assign the 17/24 GHz spectrum through an auction or a processing round,[2] but fails to show how auctions could be authorized under the ORBIT Act[3] as elucidated in *Northpoint Technology, Ltd. vs. FCC*.[4] Moreover, it would not serve the public interest for the FCC to return to the delays and costs associated with a processing round.

As discussed in Intelsat's opening comments, absent a revision of FCC policies, the *Northpoint* decision forbids auction of slots in the 17/24 GHz BSS spectrum.[5] EchoStar notes that the *Northpoint* case did not foreclose the possibility that an auction of this spectrum would be lawful if the Commission could provide a "better explanation" for its decision to do so and could "demonstrate that the spectrum rights being auctioned are tied closely to the provision of domestic (rather than international) satellite service."[6] EchoStar's proposed rule prohibiting international service on 80 percent of the capacity of a 17/24 GHz BSS satellite, however, should be rejected. Such an artificial limit not

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[2] *See* Comments of EchoStar Satellite L.L.C., IB Dkt. No. 06-123, at 5 (filed Oct. 16, 2006) ("EchoStar Comments").

[3] Open-Market Reorganization for the Betterment of International Telecommunications Act, Pub. L. No. 106-180, 114 Stat. 48 (2000), as amended, Pub. L. No. 107-233, 116 Stat. 1480 (2002), as amended, Pub. L. No. 108-228, 118 Stat. 644 (2004), as amended, Pub. L. No. 108-371, 118 Stat. 1752 (2004) (codified at 47 U.S.C. §§ 761-769) ("ORBIT Act").

[4] *Northpoint Tech., Ltd. vs. FCC*, 412 F.3d 145 (D.C. Cir. 2005) ("*Northpoint*").

[5] Comments of Intelsat North America LLC, IB Dkt. No. 06-123, at 2-3 (filed Oct. 16, 2006) ("Intelsat Comments").

[6] EchoStar Comments at 14.

only contradicts the Commission's *DISCO I* policy of "encouraging" satellite licensees to provide both domestic and international service, but it also is not sufficient to render the spectrum auctionable. The *Northpoint* court was well aware that the planned DBS bands at issue in the case were often used for very limited international service, noting that the grant for the EchoStar 7 satellite to direct a *single* spot beam out of 15 toward Mexico City was evidence that the Commission "gave every appearance of practicing" its *DISCO I* policy.[7]

EchoStar's suggestion that the Commission restrict the amount of capacity 17/24 GHz BSS licensees may use to provide international service also constitutes an unnecessary regulatory impediment to the applicants' business plans. Under EchoStar's proposed limit, operators planning to use the 17.7-17.8 GHz band for international service could not provide international service in any other portion of the downlink band. There is no reason for the Commission to so restrict the ability of operators to meet customers' service demands.

EchoStar next argues that if the Commission rejects auctions, it should assign the 17/24 GHz BSS band using a processing round because first-come, first-served is a flawed licensing approach. These arguments, however, amount to nothing more than a late-filed petition for reconsideration of the 2003 *Space Station Reform Order*,[8] where the Commission considered and rejected each of EchoStar's arguments. First, the agency found that the first-come, first-served procedure fully met the requirements of the

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[7] *Nortpoint*, 412 F.3d at 153.

[8] *Amendment of the Comm'n's Space Station Licensing Rules and Policies*, First Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 10,760 (2003) ("*Space Station Reform Order*"); 47 C.F.R. § 1.106(f) (petitions for reconsideration must be filed within 30 days from the date of public notice of the final Commission action).

Communications Act and *Ashbacker v. FCC*.[9] Second, the Commission found that the first-come, first-served procedure did not necessarily increase the incentive for speculation beyond that in processing rounds, and that the numerous safeguards in the first-come, first-served procedure – the bond requirement, milestones, limit on the number of pending applications and unbuilt satellites, prohibition on the sale of places in the application queue, and requirement for applications to be substantially complete – would "substantially reduce" the risk of speculation.[10] Third, the Commission found that "financial qualification requirements have not proven to be determinative of whether a licensee implements a system," and that its milestone policy was a sufficient mechanism to ensure that spectrum was used as intended.[11] Finally, the Commission specifically rejected a processing round approach for GSO-like licenses, holding that it must "expedite the licensing process dramatically" because the delays caused by processing rounds "impose real and substantial economic costs on satellite customers as well as service providers."[12]

Furthermore, first-come, first-served has been proved to be an effective approach. The Commission recently stated that its "experience with the first-come, first-served approach indicates that it would also allow [the Commission] to issue licenses for DBS satellites quickly, while still accommodating existing or new competitive systems in the

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9 *Space Station Reform Order*, 18 FCC Rcd at 10,801 (¶ 100).

10 *Id.* at 10,797, 10,846-53 (¶¶ 86, 226, 228-244).

11 *Id*. at 10,824 (¶ 164).

12 *Id.* at 10,711 (¶ 16). *See also id.* at n. 50 (citing industry participant's comment that the Second Ka-band processing round was "unfortunately all too lengthy").

same spectrum."[13] In the FSS context, first-come, first-served has reduced the processing time for satellite applications to an all-time low,[14] while the associated safeguards have resulted in the licensing of available orbital locations to operators such as EchoStar, who have promptly constructed their satellites in accordance with the relevant milestones and brought them into use.[15] As the Commission previously stated in the satellite licensing context (quoting the D.C. Circuit), "a month of experience [is] worth a year of hearings."[16] Far from being the "flawed licensing approach" that EchoStar suggests, first-come, first-served has worked well, and should be applied to the 17/24 GHz BSS band, consistent with the ORBIT Act.

II. THE COMMISSION SHOULD ADOPT FOUR-DEGREE ORBITAL SPACING AND ALLOW ONE-TIME MODIFICATIONS TO PENDING APPLICATIONS TO ALIGN REQUESTED ORBITAL LOCATIONS WITH THE ADOPTED "GRID"

DIRECTV and SES Americom in their comments supported a four-degree orbital separation in the 17/24 GHz BSS band, with orbital locations generally coinciding with existing FSS slots.[17] This is in line with Intelsat's views that routine licensing should be

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13 *See Amendment of the Comm'n's Policies and Rules for Processing Applications in the Direct Broad. Satellite Service; Feasibility of Reduced Orbital Spacing for Provision of Direct Broad. Satellite Service in the United States,* Notice of Proposed Rulemaking, 21 FCC Rcd 9443, 9445 (¶ 24) (2006) ("*DBS NPRM*").

14 Intelsat Comments at 4 & n. 15.

15 *See e.g. Policy Branch Information: Satellite Space Applications Action Taken*, Public Notice, 21 FCC Rcd 9932 (2006) (noting that EchoStar had met certain Contract Execution milestones); *Policy Branch Information: Satellite Space Applications Action Taken*, Public Notice, 21 FCC Rcd 6000 (2006) (noting that EchoStar had met the Critical Design Review Milestone).

16 *Licensing of Space Stations in the Domestic Fixed-Satellite Service and Related Revisions of Part 25 of the Rules and Regulations,* Report and Order, 54 Rad. Reg. 2d (P&F) 577, 596 (¶ 64) (1983) (quoting *American Airlines, Inc. v. C.A.B.,* 399 F. 2d 624, 633 (D.C. Cir. 1966)).

17 Comments of DIRECTV, Inc., IB Dkt. No. 06-123, 3-8 (filed Oct. 16, 2006) ("DIRECTV Comments"); *See* Comments of SES Americom, IB Dkt. No. 06-123, 9-14 (filed Oct. 16, 2006) ("SES Americom Comments").

based on a four-degree grid nominally coinciding with every other location of the current two-degree grid of Ku-band and Ka-band FSS satellites.[18]

In this context there would be two possible "grids" for 17/24 GHz BSS nominal slots. The first grid, referred to as "grid 1," would begin at 65° W.L. The second grid, referred to as "grid 2," would begin at 67° W.L. The possible orbital locations in grids 1 and 2 are shown below in Table 1.

Table 1. Two Possible Four-Degree Grids of Nominal 17/24 GHz BSS Orbital Locations

Grid 1	**Grid 2**
65°W	67°W
69°W	71°W
73°W	75°W
77°W	79°W
81°W	83°W
85°W	87°W
89°W	91°W
93°W	95°W
97°W	99°W
101°W	103°W
105°W	107°W
109°W	111°W
113°W	115°W
117°W	119°W
121°W	123°W
125°W	127°W

[18] Intelsat Comments at 7-8.

129°W	131°W
133°W	135°W
137°W	139°W
141°W	143°W

Considering the 17/24 GHz BSS applications currently on file with the FCC, it is clear that some existing applications will not match orbital locations in the grid, regardless of the grid selected. Indeed, while grid 1 would conveniently accommodate one set of existing applications, grid 2 would better accommodate another set, and some of the applications will fit neither grid 1 nor grid 2. Thus, if the Commission adopts first-come, first-served as Intelsat suggests and also determines that a minimal orbital separation is desirable and should be made mandatory, applicants should be provided with a one-time opportunity to amend pending applications (orbital locations and any other technical parameters) without losing their position in the queue. As Intelsat proposed in its earlier comments, the Commission should permit each entity that had applications pending as of the date of the *Notice* to amend a single application at a time, in order of the entity's (rather than individual application's) current position in the pre-*Notice* queue.[19] This procedure will ensure that orbital locations in the 17/24 GHz BSS service will be assigned so as to encourage competition.

[19] Thus, if A filed multiple applications, and later B, then C, filed multiple applications (all before the date of the *Notice*), then A would amend one of its applications first. Next, B would be allowed to amend one of its applications, followed by C. The process would repeat in that order (so long as an applicant continued to have a pending application) until all applications are exhausted.

III. PROTECTION OF 45 CM ANTENNAS AND AN AGGREGATE C/I OF 19 DB ARE CONSISTENT WITH FOUR-DEGREE SPACING

The proposal by EchoStar and SES Americom that licensing be based on a minimum antenna size of 45 cm is consistent with Intelsat's view that routine licensing of 17/24 GHz BSS space stations should be based on a minimum orbital spacing of four degrees.[20] Furthermore, Intelsat agrees with comments by SES Americom and DIRECTV that the earth station antenna patterns in ITU-R Recommendation BO.1213 be used as the baseline for the protection of earth stations using 45 cm antennas operating in the 17/24 GHz BSS band.

The link budgets in Exhibit 1 attached hereto indicate that use of 45 cm antennas conforming with ITU-R Recommendation BO.1213 associated with space stations at every four degrees would allow operators to achieve availability levels as high as 99.9% in some cities, assuming an aggregate carrier-to-interference (C/I) ratio of 19 dB and power-flux density (pfd) on the Earth of -115 dBW/MHz/m^2. However, Intelsat is of the view that the Commission should not specify any availability objective for 17 GHz systems, and disagrees with SES Americom in this respect. Operators should have the flexibility to design links that optimize the use of their available resources so as to best meet the requirements of their customers. Moreover, the computation of availability is subject to inaccuracies that vary from one geographic area to another, as can be verified from the differences that exist in the rain attenuation computed using different propagation models, *i.e.,* the various ITU models per Recommendations ITU-R P.618 (revisions 1 to 5) and ITU-R P.837 (revisions 1 and 2), the Crane, Rice Holmberg or DAH models. While these propagation models are a very useful aid in the design of

[20] SES Americom Comments at 5-7; Echostar Comments at 12.

satellite links, protecting 17/24 GHz BSS links based on an availability computed with these approximate models (which seldom match the actual link performance on site) might unnecessarily constrain the range of services that can be provided in this band.

Intelsat also believes that protection of 17/24 GHz BSS links based on an aggregate C/I ratio of 19 dB is adequate. Indeed, as seen in Table 2 below, 19 dB represents the absolute worst case aggregate C/I value resulting from interference due to six adjacent satellites operating at the same e.i.r.p. density levels, assuming a station keeping error of 0.05º and a 45 cm antenna with a mispointing error of 0.5 degrees. As such, Intelsat is of the view that a C/I of 19 dB combined with a pfd of -115 dBW/m^2/MHz and a 45 cm antenna provides a better trade-off than the DIRECTV solution involving a C/I of 21 dB.

Table 2. Single-Entry and Worst Case Aggregate Carrier-to-Interference Ratios into a 45 cm Antenna Due to Transmissions from Adjacent Satellite Networks at Every Four Degrees

	Satellite L3	Satellite L2	Satellite L1	Wanted Satellite	Satellite R1	Satellite R2	Satellite R3	Total
Relative nominal location (º)	-12	-8	-4	0	+4	+8	+12	
Worst case relative location (º)	-11.9	-7.9	-3.9	0	+3.9	+7.9	+11.9	
Nominal topocentric angle (º)	13.1	8.7	4.3	0	4.3	8.7	13.1	
Mispointed topocentric angle (º)	13.6	9.2	4.8	N/A	3.8	8.2	12.6	
C/I (dB)	35.8	31.6	24.5	N/A	21.9	30.3	35	19.1

IV. POWER-FLUX DENSITY ON EARTH SHOULD BE LIMITED TO -115 DBW/M^2/MHZ

DIRECTV has proposed a variable power-flux density (pfd) over the U.S. territory.[21] Intelsat believes that adopting a uniform pfd limit over the U.S. territory will allow for the operational flexibility needed to maximize the use of the 17 GHz spectrum, and will avoid complicating the rules associated with the use of this band.

As discussed below, specific operational constraints can be taken into account by making appropriate modifications in the configuration of 17/24 GHz BSS systems. For example, the baseline link budget information provided in Exhibit 1 indicates that a maximum pfd value of -115 dBW/m^2/MHz would allow operators to achieve an availability level of 99.9% or better for transmissions to a 45 cm receive earth station

[21] *See* DIRECTV Comments at 10-14.

antenna located in some specific cities (*e.g.*, Reno, Riverside and Hagerstown). For a pfd of -118 dBW/m^2/MHz, the same level of availability could be maintained in these cities through the use of a 65 cm antenna. In cities subject to higher rainfall rates, such as Miami, the same 99.9% availability level would be maintained by operating with a pfd of -115 dBW/m^2/MHz and a larger antenna (65 cm). Alternatively, the pfd levels and the antenna size may be maintained, and the coding scheme for the transmissions changed (usually at the expense of capacity loss) in order to obtain the same nominal availability. Indeed, as can be seen in Table 3 below, the reference Eb/No value that determines the threshold C/N value used for defining the link availability can significantly vary depending on the coding scheme used.

Accordingly, Intelsat does not believe that adoption of a maximum pfd value lower than -115 dBW/m^2/MHz is necessary, and reaffirms its view that pfd limits over the U.S. territory should not be more restrictive than those contained in Article 21 of the ITU Radio Regulations. Furthermore, given the above calculations, Intelsat also is not convinced that a pfd limit higher than -115 dBW/m^2/MHz, as proposed by SES Americom,[22] is actually required.

[22] SES Americom Comments at 17-19.

Table 3: Eb/No Performance Requirements for DVB Based Transmissions

E_s/No performance at Quasi Error Free PER = 10^{-7} (AWGN channel)

Mode	Spectral efficiency	Ideal E_s/No (dB) for FECFRAME length = 64 800
QPSK 1/4	0,490243	-2,35
QPSK 1/3	0,656448	-1,24
QPSK 2/5	0,789412	-0,30
QPSK 1/2	0,988858	1,00
QPSK 3/5	1,188304	2,23
QPSK 2/3	1,322253	3,10
QPSK 3/4	1,487473	4,03
QPSK 4/5	1,587196	4,68
QPSK 5/6	1,654663	5,18
QPSK 8/9	1,766451	6,20
QPSK 9/10	1,788612	6,42
8PSK 3/5	1,779991	5,50
8PSK 2/3	1,980636	6,62
8PSK 3/4	2,228124	7,91
8PSK 5/6	2,478562	9,35
8PSK 8/9	2,646012	10,69
8PSK 9/10	2,679207	10,98
16APSK 2/3	2,637201	8,97
16APSK 3/4	2,966728	10,21
16APSK 4/5	3,165623	11,03
16APSK 5/6	3,300184	11,61
16APSK 8/9	3,523143	12,89
16APSK 9/10	3,567342	13,13
32APSK 3/4	3,703295	12,73
32APSK 4/5	3,951571	13,64
32APSK 5/6	4,119540	14,28
32APSK 8/9	4,397854	15,69
32APSK 9/10	4,453027	16,05
NOTE: Given the system spectral efficiency η_{tot} the ratio between the energy per information bit and single sided noise power spectral density $E_b/N_0 = E_s/N_0 - 10\log_{10}(\eta_{tot})$		

V. OFF-AXIS E.I.R.P. LIMITS SHOULD MIRROR THOSE IN SECTION 25.138(A) OF THE COMMISSION'S RULES WITH A DIFFERENT REFERENCE BANDWIDTH AND NO MEASUREMENT DATA SHOULD BE REQUIRED TO EVALUATE COMPLIANCE WITH THESE LIMITS

To the extent that the Commission wishes to impose limitations on the uplink transmissions, Intelsat believes that the requirements contained in sections 25.138(a)(1), 25.138(a)(2), 25.138(a)(3) and 25.138(a)(4) of the Commission's rules scaled to a one

MHz bandwidth, rather than to a 40 kHz bandwidth as in the current rules, are adequate. Therefore, Intelsat agrees in this respect with DIRECTV's proposal.[23] Intelsat notes that these maximum off-axis e.i.r.p. limits are consistent with the levels for transmissions in the 25 GHz band contained in the applications already submitted to the Commission.

As stated in Intelsat's comments, the more rigid procedure in Section 25.138(d), which requires provision of measured data for each antenna, should not be utilized to evaluate compliance with the off-axis e.i.r.p. limits.[24] Rather, the FCC should adopt a more flexible approach such as that in Section 25.221(b), which allows for the possibility of providing a certification of compliance with Section 25.209 combined with input power density levels.

VI. INTERFERENCE PROTECTION FOR 12 GHZ DBS SPACE STATIONS SHOULD BE ADDRESSED INDEPENDENTLY FROM ORBITAL SPACING

EchoStar and DIRECTV note in their comments the importance of assuring a certain orbital separation from DBS orbital locations in order to avert the risk of space path interference from the transmit BSS space station to the receive DBS space station.[25] EchoStar goes a step further in suggesting that locations used by DBS incumbents not be assigned to other operators.[26] Although Intelsat recognizes the need to address any impact of 17/24 GHz BSS on 12 GHz DBS operations in this proceeding, the

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23 *See* DIRECTV Comments at 14-16.

24 *See* Intelsat Comments at 11.

25 *See* EchoStar Comments at 6-9; DIRECTV Comments at 22-26.

26 *See* EchoStar Comments at 10-12.

Commission should not allow EchoStar to use the issue to block new entrants from the 17/24 GHz BSS band.

Intelsat believes that to the extent that an existing DBS licensee has already applied for a location in the 17/24 GHz BSS orbital grid (grid 1 or grid 2) for the expansion of its service offerings in the 17 GHz band, it would not be unreasonable to assign the requested location to the DBS licensee. However, in order to establish a level playing field among applicants and promote competition in this area of satellite broadcasting, the FCC should not adopt a rule requiring that orbital locations coinciding with a DBS location be assigned only to the corresponding DBS operator. Indeed, not all DBS operators are interested in colocating their DBS and 17/24 GHz BSS satellites, as can be seen from the DIRECTV comments. Additionally, such a rule would unnecessarily complicate access to the 17/24 GHz band, especially if the Commission assigns additional locations to incumbent DBS operators as a result of its "tweener" DBS proceeding.[27]

As noted in the interference analysis included in the DIRECTV comments, which also reflects results of the space path sharing analysis conducted within ITU-R Working Party 6S, a mere space station separation of up to 0.3 degrees (worst case, depending on the operational characteristics involved) would be sufficient to avert this type of interference. Intelsat thus believes that the four-degree grid of nominal orbital locations (grid 1 or grid 2) does not have to be altered because the 17 GHz space path sharing can be appropriately addressed through coordination to be conducted either according to ITU rules or rules to be set by the Commission when a 17 GHz satellite network filed with the

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[27] *See, e.g., DBS NPRM.*

ITU by the United States has to coordinate with a U.S. BSS Plan orbital location. As a result of coordination, slight deviations from the nominal grid would have to be accommodated.

Intelsat also notes that the Region 2 BSS Plan locations upon which the current DBS assignments are based would always be at least 0.2 degrees away from locations in either of the 17/24 GHz BSS orbital grids (grid 1 or 2) identified earlier. DBS satellites may be located within a cluster of ± 0.2 degrees (per Section B of Annex 7 of Appendix 30 of the Radio Regulations) and this provides additional flexibility for mitigating space path interference from the transmit BSS space station to the receive DBS space station.

Intelsat further notes that EchoStar's proposal of a 4.5 degree separation between 17/24 GHz BSS space stations in order to ensure maximum coincidence with the 12 GHz DBS orbital locations is contrary to EchoStar's own proposal that a 0.4 degree separation be adopted to avoid space path interference issues in the 17 GHz band. The discussion in the paragraph above shows that this potential interference effect can be best addressed by adopting a four-degree grid and conducting the appropriate coordination between the concerned space stations.

VII. THE COMMISSION SHOULD NOT IMPOSE A BSS-ONLY RESTRICTION ON THIS SPECTRUM

The Commission should not artificially restrict the nature of the services offered by 17/24 GHz BSS operators by prohibiting such operators from using the spectrum for ancillary purposes, as EchoStar suggests.[28] With the emergence of new technologies and the convergence of existing applications used to transmit video and video-like information to the public, Intelsat believes that a "BSS-only" restriction would unduly

[28] *See* EchoStar Comments at 20.

constrain operators' ability to provide important services such as IPTV, distance learning, telemedicine, enterprise or government video conferencing, or other broadband services that today may or may not fall within the scope of the BSS definition. In addition, a "BSS-only" restriction would unduly hamper operators' ability to tailor their network infrastructure and service offerings to meet the increasing, pro-competitive trend toward choice and customization for individual consumers of video and other media, contrary to the public interest.

VIII. DBS FEEDER LINKS SHOULD BE ALLOWED IN THE 25 GHZ BAND

In its comments, DIRECTV recognizes that "the flexibility to use this alternative uplink spectrum could be useful in avoiding ground path interference problems associated with reverse band operations in the DBS uplink band."[29] This is consistent with Intelsat's proposal that the 25 GHz band be made available for use by feeder links of 12 GHz DBS space stations.[30] However, Intelsat disagrees with the DIRECTV assessment of the sharing issue that would result from allowing such use. In Intelsat's view, DIRECTV overstates potential problems associated with this additional use of the 25 GHz band.

DIRECTV suggests that "[b]ecause of the greater atmospheric attenuation at this higher frequency, it will be necessary to deploy diversity sites for each feeder link," thus "effectively doubl[ing] the number of feeder link earth stations," which "could significantly increase the potential burden on system[s] sharing the band."[31] However,

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29 DIRECTV Comments at 35.

30 Intelsat Comments at 10.

31 DIRECTV Comments at 35.

the number of DBS feeder links that would be deployed will be very limited, thus significantly facilitating the prospect of identifying a site that would ensure operations without electromagnetic interference problems. For example, taking DIRECTV as an example, all of its DBS operations currently are supported from only four sites across the United States, with no plans for additional regional sites.

Furthermore, as DIRECTV notes in its comments, the other co-primary users of this band are the terrestrial 24 GHz Fixed Service operators, which only use the 25.05-25.25 GHz portion of the spectrum, and the radionavigation service in the 24.75-25.05 GHz band.[32] With respect to the former, DIRECTV indicates that its analysis of the 24 GHz Fixed Service licensed areas shows that "there are large portions of the country where none of these systems are licensed to operate."[33] This clearly suggests vast areas where 17 GHz BSS, and a few additional 12 GHz DBS, feeder links could be located, following the well-established Commission procedures (Sections 25.203, 25.204, and 25.205) for sharing between satellite earth stations and terrestrial fixed stations. A similar conclusion can be reached with respect to the 24.75 GHz to 25.05 GHz band, where the deployment of radionavigation systems would likely be even more limited in scope, as DIRECTV also notes in its comments.[34]

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[32] *Id.* at 28.

[33] *Id.* at 29.

[34] *Id.* at 32.

IX. THE COMMISSION SHOULD FREEZE FURTHER FS DEPLOYMENT IN THE BAND 17.7-17.8 GHZ AND DESIGNATE BSS AND FS AS CO-PRIMARY IN THAT BAND

The Commission should authorize and protect the reception of BSS (space-to-Earth) transmissions in the United States in the 17.7-17.8 GHz band. All current 17/24 GHz applicants intend to utilize the full 500 MHz of spectrum from 17.3-17.8 GHz and presumably desire the ability to provide service in 17.7-17.8 GHz in the United States on a protected basis.

In order to facilitate coordination with Fixed Service ("FS") operators in the 17.7-17.8 GHz band, FS deployment should be frozen after a certain date. This would allow BSS operators to deploy their receive earth stations based on complete knowledge of the location of FS transit stations. Alternatively, the Commission could allow FS deployment to continue in the band while giving BSS and FS co-primary status. In that scenario, BSS receive earth stations could only be protected on a site-by-site basis, which would prevent widespread deployment of unlicensed receive earth stations. Nevertheless, satellite operators could still make use of this spectrum and increase the overall efficiency of its utilization.

In addition, as Intelsat previously noted, no FCC rule change is required with regard to international use of the 17.7-17.8 GHz band because such use is authorized in the ITU International Frequency Allocation Table. This approach is consistent with the treatment given to other bands, such as the 11.7-12.2 GHz band, which U.S. operators are allowed to use for BSS service over Europe and Africa based on the ITU frequency allocation table, without any FCC rule specifically permitting such use.

In order to protect the terrestrial services in this based, the FCC should impose on BSS transmission in the 17.7-17.8 GHz band the same pfd limits in Article 21 of the ITU

Radio Regulations applicable to the FSS in the 17.7-19.7 GHz band. The Commission should not adopt more stringent limits because even if BSS is not authorized in the United States in the 17.7-17.8 GHz band, such limits would unduly constrain operations in neighboring countries without any meaningful purpose given the adequate protection afforded FS by the current Article 21 limits.[35]

X. CONCLUSION

The Commission should not adopt an auction process for the 17/24 GHz BSS band, and should instead adopt a first-come, first-served licensing procedure. In addition, the Commission should adopt the proposals of Intelsat and others supported above.

[35] FS systems in 17.7-17.8 GHz have basically the same characteristics as those above 17.8 GHz and the Article 21 pfd limits being proposed here have been considered appropriate to protect the latter.

Respectfully submitted,

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Dated: November 15, 2006

EXHIBIT 1: SAMPLE LINK BUDGETS

			CLEAR-SKY				DEGRADED			
Carrier	Carrier Type		24MG7W	24MG7W	24MG7W	24MG7W	24MG7W	24MG7W	24MG7W	24MG7W
	Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
	Bits/Symbol		2	2	2	2	2	2	2	2
	Info Rate	Mbit/s	26.65	26.65	26.65	26.65	26.65	26.65	26.65	26.65
	FEC:		0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
	RS:		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Noise BW:	MHz	19.988	19.988	19.988	19.988	19.988	19.988	19.988	19.988
	Eb/No required:	dB	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
	C/N required	dB	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
	Terrestrial losses	dB	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Adjusted required C/N	dB	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
S/C Loc	Longitude	deg	-95.00	-95.00	-95.00	-95.00	-95.00	-95.00	-95.00	-95.00
	Inclination	deg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beam Polarization Frequency	Uplink Beam Name		NRF	NRF	NRF	NRF	NRF	NRF	NRF	NRF
	Polarisation (H, V or, C)		C	C	C	C	C	C	C	C
	Uplink Frequency	MHz	24750.0	24750.0	24750.0	24750.0	24750.0	24750.0	24750.0	24750.0
	Downlink Beam Name		NTF	NTF	NTF	NTF	NTF	NTF	NTF	NTF
	Polarisation (H, V or, C)		C	C	C	C	C	C	C	C
	Downlink Frequency	MHz	17300.0	17300.0	17300.0	17300.0	17300.0	17300.0	17300.0	17300.0
Rain Analysis	Rain Model (ITU/Crane)						ITU	ITU	ITU	ITU
	% time uplink rain attenuation exceeded						99.97	99.97	99.97	99.98
	% time downlink rain attenuation exceeded						99.93	99.93	99.93	99.82
	Total Link Availability						99.9	99.9	99.9	99.8
Tx E/S			Denver	Denver	Denver	Denver	Denver	Denver	Denver	Denver
	ES Longitude	deg	-105.0	-105.0	-105.0	-105.0	-105.0	-105.0	-105.0	-105.0
	ES Latitude	deg	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
	H	km	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Temperature ground	deg C	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
	Humidity	%	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	Rain Zone (as per rain model)		E	E	E	E	E	E	E	E
	Uplink Power Control range	dB	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	Uplink Power Control Accuracy	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Range	deg	37532.0	37532.0	37532.0	37532.0	37532.0	37532.0	37532.0	37532.0
	E/S Elevation angle	deg	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2
	E/S Azimuth angle	deg	164.5	164.5	164.5	164.5	164.5	164.5	164.5	164.5
	E/S size	m	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
	Transmit E/S peak gain (Eff=0.65)	dB	65.1	65.1	65.1	65.1	65.1	65.1	65.1	65.1
Rx E/S			Reno	Riverside	Hagerstwn	Miami	Reno	Riverside	Hagerstwn	Miami
	ES Longitude	deg	-119.8	-117.2	-77.4	-80.2	-119.8	-117.2	-77.4	-80.2
	ES Latitude	deg	39.5	33.6	39.3	25.5	39.5	33.6	39.3	25.5
	H	km	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Temperature ground	deg C	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
	Humidity	%	30.0	50.0	40.0	65.0	30.0	50.0	40.0	65.0
	Rain Zone (as per rain model)		D	E	K	N	D	E	K	N
	Range	deg	37957.8	37457.1	37695.5	36722.6	37957.8	37457.1	37695.5	36722.6
	E/S Elevation angle	deg	37.6	44.3	41.0	55.9	37.6	44.3	41.0	55.9
	E/S Azimuth angle	deg	144.0	143.6	-153.4	-148.3	144.0	143.6	-153.4	-148.3
	E/S size	m	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
	Receive E/S peak gain (Eff=0.65)	dB	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4
	System (LNA + Sky) Noise Temp.	km	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0
	Temperature due to rain fade and gases	K	5.9	5.2	5.5	4.4	155.1	171.8	231.9	260.7
	Receive E/S G/T	dB/K	13.4	13.4	13.4	13.5	11.0	10.8	10.1	9.8
Uplink Thermal	U/L eirp	dBW	71.2	72.3	75.5	79.0	71.6	72.3	75.9	79.0
	Uplink PSD	dBW/Hz	-67.0	-65.9	-62.6	-59.1	-66.6	-65.9	-62.2	-59.1
	Transponder BP SFD	dBW/m2	-84.0	-84.0	-84.0	-84.0	-83.6	-84.0	-83.6	-84.0
	Input Backoff	dB	-10.1	-9.0	-5.7	-2.2	-10.1	-9.0	-5.7	-2.2
	Gain of 1 m2	dBi	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3
	Uplink Path Loss, clear sky	dB	212.2	212.2	212.2	212.2	212.2	212.2	212.2	212.2
	Uplink gaseous attenuation	dB	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0
	Uplink rain attenuation	dB	0.0	0.0	0.0	0.0	9.1	9.1	9.1	10.7
	Up link power control correction (dB)		0.0	0.0	0.0	0.0	9.1	9.1	9.1	10.7
	+ Satellite G/T	dB/K	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
	Antenna pattern towards E/S	dB	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
	C/N thermal uplink	dB	20.0	21.1	24.3	27.8	19.5	20.2	23.9	27.0
Downlink Thermal	S/C saturated EIRP (Beam Peak)	dBW	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8
	Carrier Output backoff	dB	-8.2	-7.1	-3.8	-0.3	-8.2	-7.1	-3.8	-0.3
	Antenna pattern towards E/S	dB	-1.5	-2.0	-1.5	-2.0	-1.5	-2.0	-1.5	-2.0
	Downlink EIRP towards E/S	dBW	51.1	51.7	55.4	58.4	51.1	51.7	55.4	58.4
	Downlink Path Loss, clear sky	dB	209.0	208.9	208.9	208.7	209.0	208.9	208.9	208.7
	Downlink gaseous attenuation	dB	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3
	Downlink rain attenuation		0.0	0.0	0.0	0.0	3.1	3.6	6.7	9.7
	- Antenna Pointing error	dB	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	+ Earth Station G/T, clear sky	dB/K	13.4	13.4	13.4	13.5	11.0	10.8	10.1	9.8
	C/N thermal downlink	dB	10.7	11.5	15.1	18.5	5.0	5.0	4.9	4.9
Other	C/I (Other link degradation)	dB	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
ASI	C/I (Aggregate ASI)	dB	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Total	Available C/N	dB	9.5	10.2	13.0	15.0	4.6	4.6	4.6	4.7
	PFD	dBW/m2/MHz	-123.2	-122.0	-118.8	-115.0	-123.2	-122.0	-118.8	-115.0
	Margin	dB	4.9	5.6	8.4	10.4	0.0	0.0	0.0	0.0
ASI	Geocentric Separation	deg	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Topocentric Separation w/o pointing error	deg	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
	Orbital Separation w/pointing error	deg	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Interfering Uplink power density	dBW/Hz	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5
	Interfering D/L eirp density	dBW/Hz	-12.2	-12.3	-12.3	-12.5	-12.2	-12.3	-12.3	-12.5
	D/Lamda		26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
	Gain at offset angle	dB	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	C/I ASI uplink	dB	41.7	42.9	46.1	49.6	42.2	42.9	46.5	49.6
	C/I ASI downlink	dB	12.3	13.1	16.7	20.0	12.3	13.1	16.7	20.0
	C/I (ASI total)	dB	12.3	13.1	16.7	20.0	12.3	13.1	16.7	20.0
	Net C/(N+I) Composite w/ASI up	dB	9.5	10.2	13.0	15.0	4.6	4.6	4.6	4.7
	Net C/(N+I) Composite w/ASI dn	dB	7.7	8.4	11.5	13.8	4.0	4.1	4.4	4.6
	Net C/(N+I) Composite w/ASI tot	dB	7.7	8.4	11.5	13.8	4.0	4.1	4.4	4.6
	ASI uplink	%	0%	0%	0%	0%	0%	0%	0%	0%
	ASI downlink	%	15%	13%	6%	3%	15%	13%	6%	3%
	ASI total	%	15%	13%	6%	3%	15%	13%	6%	3%
	ASI degradation	dB	0.7	0.6	0.3	0.1	0.7	0.6	0.3	0.1

			CLEAR-SKY				DIEGRADED			
Carrier	Carrier Type		24MG7W	24MG7W	24MG7W	24MG7W	24MG7W	24MG7W	24MG7W	24MG7W
	Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
	Bits/Symbol		2	2	2	2	2	2	2	2
	Info Rate	Mbit/s	26.65	26.65	26.65	26.65	26.65	26.65	26.65	26.65
	FEC:		0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
	RS:		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Noise BW:	MHz	19.988	19.988	19.988	19.988	19.988	19.988	19.988	19.988
	Eb/No required:	dB	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
	C/N required	dB	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
	Terrestrial losses	dB	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Adjusted required C/N	dB	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
S/C Loc	Longitude	deg	-123.00	-123.00	-123.00	-123.00	-123.00	-123.00	-123.00	-123.00
	Inclination	deg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Beam Polarization Frequency	Uplink Beam Name		NRF	NRF	NRF	NRF	NRF	NRF	NRF	NRF
	Polarisation (H, V or, C)		C	C	C	C	C	C	C	C
	Uplink Frequency	MHz	24750.0	24750.0	24750.0	24750.0	24750.0	24750.0	24750.0	24750.0
	Downlink Beam Name		NTF	NTF	NTF	NTF	NTF	NTF	NTF	NTF
	Polarisation (H, V or, C)		C	C	C	C	C	C	C	C
	Downlink Frequency	MHz	17300.0	17300.0	17300.0	17300.0	17300.0	17300.0	17300.0	17300.0
Rain Analysis	Rain Model (ITU/Crane)						ITU	ITU	ITU	ITU
	% time uplink rain attenuation exceeded						99.97	99.97	99.97	99.99
	% time downlink rain attenuation exceeded						99.93	99.93	99.93	99.75
	Total Link Availability						99.9	99.9	99.9	99.74
Tx E/S	ES Longitude	deg	Denver -105.0	Denver -105.0	Denver -105.0	Denver -105.0	Denver -105.0	Denver -105.0	Denver -105.0	Denver -105.0
	ES Latitude	deg	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
	H	km	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Temperature ground	deg C	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
	Humidity	%	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	Rain Zone (as per rain model)		E	E	E	E	E	E	E	E
	Uplink Power Control range	dB	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	Uplink Power Control Accuracy	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Range	deg	37718.5	37718.5	37718.5	37718.5	37718.5	37718.5	37718.5	37718.5
	E/S Elevation angle	deg	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7
	E/S Azimuth angle	deg	-152.9	-152.9	-152.9	-152.9	-152.9	-152.9	-152.9	-152.9
	E/S size	m	**9.00**	**9.00**	**9.00**	**9.00**	**9.00**	**9.00**	**9.00**	**9.00**
	Transmit E/S peak gain (Eff=0.65)	dB	65.1	65.1	65.1	65.1	65.1	65.1	65.1	65.1
Rx E/S	ES Longitude	deg	Reno -119.8	Riverside -117.2	Hagerstwn -77.4	Miami -80.2	Reno -119.8	Riverside -117.2	Hagerstwn -77.4	Miami -80.2
	ES Latitude	deg	39.5	33.6	39.3	25.5	39.5	33.6	39.3	25.5
	H	km	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Temperature ground	deg C	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
	Humidity	%	30.0	50.0	40.0	65.0	30.0	50.0	40.0	65.0
	Rain Zone (as per rain model)		D	E	K	N	D	E	K	N
	Range	deg	37460.6	37041.8	39071.6	38235.9	37460.6	37041.8	39071.6	38235.9
	E/S Elevation angle	deg	44.2	50.5	24.9	34.3	44.2	50.5	24.9	34.3
	E/S Azimuth angle	deg	-174.9	-169.6	-121.8	-114.8	-174.9	-169.6	-121.8	-114.8
	E/S size	m	**0.45**	**0.45**	**0.45**	**0.46**	**0.45**	**0.45**	**0.45**	**0.45**
	Receive E/S peak gain (Eff=0.65)	dB	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4
	System (LNA + Sky) Noise Temp.	km	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0
	Temperature due to rain fade and gases	K	5.2	4.7	8.6	6.4	144.8	164.1	256.7	258.0
	Receive E/S G/T	dB/K	13.4	13.5	13.4	13.4	11.1	10.9	9.9	9.8
Uplink Thermal	U/L eirp	dBW	70.7	71.3	78.6	79.1	71.1	71.8	79.1	79.1
	Uplink PSD	dBW/Hz	-67.5	-66.3	-59.5	-59.0	-67.1	-66.3	-59.1	-59.0
	Transponder BP SFD	dBW/m2	-84.0	-84.0	-84.0	-84.0	-83.6	-84.0	-83.6	-84.0
	Input Backoff	dB	-10.7	-9.4	-2.7	-2.2	-10.7	-9.4	-2.7	-2.2
	Gain of 1 m2	dBi	49.3	49.3	49.3	49.3	49.3	49.3	49.3	49.3
	Uplink Path Loss, clear sky	dB	212.2	212.2	212.2	212.2	212.2	212.2	212.2	212.2
	Uplink gazeous attenuation	dB	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0
	Uplink rain attenuation	dB	0.0	0.0	0.0	0.0	9.4	9.4	9.4	14.5
	Up link power control correction (dB)		0.0	0.0	0.0	0.0	9.4	9.4	9.4	14.5
	+ Satellite G/T	dB/K	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
	Antenna pattern towards E/S	dB	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
	C/N thermal uplink	dB	19.4	20.6	27.4	27.8	18.9	19.7	26.9	26.9
Downlink Thermal	S/C saturated EIRP (Beam Peak)	dBW	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.8
	Carrier Output backoff	dB	-8.8	-7.5	-0.8	-0.3	-8.8	-7.5	-0.8	-0.3
	Antenna pattern towards E/S	dB	-1.5	-2.0	-1.5	-2.0	-1.5	-2.0	-1.5	-2.0
	Downlink EIRP towards E/S	dBW	50.5	51.2	58.5	58.4	50.5	51.2	58.5	58.4
	Downlink Path Loss, clear sky	dB	208.9	208.8	209.4	209.1	208.9	208.8	209.4	209.1
	Downlink gazeous attenuation	dB	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5
	Downlink rain attenuation		0.0	0.0	0.0	0.0	2.8	3.4	9.0	9.1
	- Antenna Pointing error	dB	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
	+ Earth Station G/T, clear sky	dB/K	13.4	13.5	13.4	13.4	11.1	10.9	9.9	9.8
	C/N thermal downlink	dB	10.3	11.1	17.7	18.0	5.0	5.0	4.9	4.9
Other	C/I (Other link degradation)	dB	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
ASI	C/I (Aggregate ASI)	dB	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Total	Available C/N	dB	9.2	9.9	14.6	14.8	4.6	4.6	4.6	4.7
	PFD	dBW/m2/MHz	-123.7	-122.3	-116.2	-115.4	-123.7	-122.3	-116.2	-115.4
	Margin	dB	4.5	5.3	9.9	10.1	0.0	0.0	0.0	0.0
ASI	Geocentric Separation	deg	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Topocentric Separation w/o pointing error	deg	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
	Orbital Separation w/pointing error	deg	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	Interfering Uplink power density	dBW/Hz	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5
	Interfering D/L eirp density	dBW/Hz	-12.3	-12.5	-11.9	-12.1	-12.3	-12.5	-11.9	-12.1
	D/Lamda		26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
	Gain at offset angle	dB	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	C/I ASI uplink	dB	41.2	42.5	49.2	49.7	41.7	42.5	49.6	49.7
	C/I ASI downlink	dB	11.9	12.7	19.4	19.6	11.9	12.7	19.4	19.6
	C/I (ASI total)	dB	11.9	12.7	19.4	19.6	11.9	12.7	19.4	19.6
	Net C/(N+I) Composite w/ASI up	dB	9.2	9.9	14.6	14.8	4.6	4.6	4.6	4.7
	Net C/(N+I) Composite w/ASI dn	dB	7.3	8.1	13.3	13.5	3.9	4.0	4.5	4.5
	Net C/(N+I) Composite w/ASI tot	dB	7.3	8.1	13.3	13.5	3.9	4.0	4.5	4.5
	ASI uplink	%	0%	0%	0%	0%	0%	0%	0%	0%
	ASI downlink	%	15%	14%	3%	3%	15%	14%	3%	3%
	ASI total	%	15%	14%	3%	3%	15%	14%	3%	3%
	ASI degradation	dB	0.8	0.6	0.1	0.1	0.8	0.6	0.1	0.1